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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/751,390	01/05/2004	Johannes Kaeppeler	03345-P0046A	2672

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EXAMINER	
MACARTHUR, SYLVIA	
ART UNIT	PAPER NUMBER
1763	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	12/28/2006	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/751,390	KAEPPELER, JOHANNES	
	Examiner	Art Unit	
	Sylvia R. MacArthur	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 October 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 January 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *11/2/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/6/2006 has been entered.

Priority

2. Applicant is advised of possible benefits under 35 U.S.C. 119(a)-(d), wherein an application for patent filed in the United States may be entitled to the benefit of the filing date of a prior application filed in a foreign country.

3. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Germany on 07/4/2001. It is noted, however, that applicant has not filed a certified copy of the German application as required by 35 U.S.C. 119(b).

Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Germany on 4/22/2002 It is noted, however, that applicant has not filed a certified copy of the PCT application as required by 35 U.S.C. 119(b).

Response to Arguments

4. Applicant's arguments with respect to claims 1 and 3-17 have been considered but are moot in view of the new ground(s) of rejection necessitated by the amendment to claims 1 and 14 wherein the holder is claimed to be heated by electrical conduction. The prior art of Rupp et al (US 2001/0052324) teaches an internal HF coil 4, that provide heat to the susceptor 1 via

electrical conduction (due to the proximity of the coils to the substrate and the material of construction of the susceptor as a metal).

Applicant argues that the language wherein the zone of higher conductivity substantially corresponds to the supported surface of the substrate (claim 1) or that the first substrate holder zone is substantially corresponding to an area taken up by the substrate (claim 14) should be interpreted that the size of zone corresponds to the size of the substrate. First of all, neither claim 1 nor 14 specifically claim that the size of the zone and the size of the substrate is the same. Secondly, r*ecall that the inclusion of the substrate or article worked upon by a structure being claimed does not impart patentability to the claims, In re Young, 75 F. 2d 966, 25 USPQ 69 (CCPA 1935(as restated in In re Otto, 312 F. 2d 937, 136 USPQ 458, 459 (CCPA 1963). An apparatus is what it is and not what it does. The recited substrate and its insinuated size are interpreted as a matter of an intended use.*

The examiner has considered applicant's arguments to Rupp et al (US 6,740,167 henceforth referred to as Rupp et al '167). Rupp et al teaches a first zone (insert 2) and a second zone (the other portions of susceptor 1 that are not part of insert 2). Though, Rupp et al does not specifically teach that the materials of construction between the insert and the susceptor differ basis electrical conductivity, it is noted that electrical conductivity is a physical property that is inherent to materials of construction. Rupp et al teaches that the insert 2 is made of a metal while the susceptor is made of graphite, see col. 4 lines 43-59 and col. 5 lines 44-52. *The Electrical Conductivity of the Elements Table* provides evidence that graphite (C) has an electrical conductivity of 0 while Ta (0.076), Mo (0.187) and W (0.189) have the recited values in x 10^6

$Ohm^{-1}cm^{-1}$. Thus, the insert made of any of these metals (Ta, Mo, or W) inherently comprises a higher electrical conductivity than graphite (carbon, C).

Claim Rejections - 35 USC § 112

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

6. Claims 1, 3-13, and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Applicant fails to distinguish whether the holder is made of a thermally or electrically conductive material. It is noted that claim 3 recites that the holder is made of graphite (also known as carbon). Claim 3 recites that the insert piece is made of a metal while claim 8 specifies that the metal is Mo, Ta, W, or the like. According to an excerpt from www.chem.shef.ac.uk, carbon is a non-metal that conducts electricity in two ways dependent upon the direction of electrical conduction. When the electricity is conducted parallel, graphite acts as a semiconductor, but when the electricity conducts perpendicular it acts like a metal. In general, the examiner holds the position that electrical conductivity relative to materials of construction:

Non-metals < Semiconductors < Metals

Applicant fails to specify in claims 1 and 14 what is the meaning of the terms "substantially corresponds to" the basis of such correspondence of the zone to the substrate is indefinite. Is it by the size, shape, or some other property?

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1,3, 8, 10,11, 14, and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Rupp et al (US 2001/0052324).

Regarding claim 1: Rupp et al (US 2001/0052324) teaches a device that produces and processes semiconductor substrates. The device inherently be used to deposit particular crystalline layers on an in particular substrate having an HF heated substrate holder (susceptor 1) see Fig.2 wherein the susceptor is heated by HF coils 4 by electrical conduction. The holder holds the substrate with surface to surface contact, the holder has a zone (cutout 6) has a higher electrical conductivity that the SiC coated susceptor 5. Note that the cut-out 6 substantially corresponds (in size and shape) to the supported surface of the substrate. Though, Rupp et al does not specifically teach that the materials of construction between the insert and the susceptor differ basis electrical conductivity, it is noted that electrical conductivity is a physical property that is inherent to materials of construction. Rupp et al teaches that the insert 2 is made of a metal

while the susceptor is made of graphite, see col. 4 lines 43-59 and col. 5 lines 44-52. *The Electrical Conductivity of the Elements Table* provides evidence that graphite (C) has an electrical conductivity of 0 while Ta (0.076), Mo (0.187) and W (0.189) have the recited values in x 10^6 $Ohm^{-1}cm^{-1}$. Thus, the insert made of any of these metals (Ta, Mo, or W) inherently comprises a higher electrical conductivity than graphite (carbon, C).

Regarding claim 3: Section [0034] recites that the susceptor 1 is made of a metal. Note that the non-coated material susceptor is the same material of the cut-out as all other portions of the susceptor are coated with covering 5 see [0036].

Regarding claim 8: Section [0034] recites that the insert is made of Mo. Ta, or W.

Regarding claim 10: The holder is above the HF coil 4 see Fig. 2

Regarding claim 11: Section [0046} recites that the device of Rupp et al is used in hot wall or cold wall reactors, Fig. 2 illustrates a cold wall reactor wherein heat is distributed to the walls only by the radiation of the heated substrate holder 1.

Regarding claim 14: Rupp et al teaches a holder 1, a HF heater 4, a first holder zone (cut-out 6) and a second substrate holder zone 5 (covering). Metals have a high electrical conductivity relative to non-metals and semiconductors. Note that the cut-out 6 substantially corresponds (in size and shape) to the area taken up by the substrate.

Regarding claim 17: [0034] recites that the insert is made of Mo. Ta, or W.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 9 and 12 rejected under 35 U.S.C. 103(a) as being unpatentable over Rupp et al (US 2001/0052324).

The teachings of Rupp et al (US 2001/0052324) were discussed above, specifically the embodiment illustrated and described by Fig. 2.

Regarding claim 9: Fig. 2 fails to teach that the holder is surrounded by an HF coil. Fig. 1 illustrates an embodiment wherein the holder is arranged in a tube wherein trh HF coil surrounds the tube and thus surrounds the holder. The motivation to surround the holder with the HF coil is that the holder can be inductively heater and the holder is heater uniformly on all sides, see [0033] of Rupp et al (US 2001/0052324). Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide HF coil to surround the holder so as to provide uniform heating over all the surfaces of the holder.

Regarding claim 12: Fig.2 fails to teach a tunnel reactor.

Figure 1 of Rupp et al (US 2001/00523324) recites a tunnel (synonymous with tube reactor) reactor according to Section [0033]. The motivation to use a tunnel reactor is that the tubular shape shields the chamber atmosphere of the process gases according to [0033] of Rupp et al US 2001/0052324. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to use a tunnel reactor as illustrated in Fig.1 as it shields the chamber atmosphere from the process gases.

Burk et al fails to teach a zone of higher electrical conductivity.

Rupp et al '167 teaches a wafer supported by a susceptor 1 that includes an insert 2 wherein the wafer is in surface-to-surface contact with the insert. Rupp et al '167 teaches in col. 2 lines 49-64 the advantage of incorporating a high temperature region (zone) in the susceptor with the motivation that such zones ensure that no contamination from the susceptor will diffuse into the substrate. Thus, it would have been obvious to construct the susceptor of Burk et al wherein the area 22 that is in surface-to-surface contact with the wafer is made of a material of higher electrical conductivity such as metal carbide.

Likewise, Rupp et al (US 2001/0052324) teaches a holder that holds the substrate with surface-to-surface contact, the holder has a zone (cutout 6) has a higher electrical conductivity that the SiC coated susceptor 5. Note that the cut-out 6 substantially corresponds (in size and shape) to the supported surface of the substrate. The abstract teaches that the motivation to construct the device of Rupp et al in this fashion so to ensure that no contamination of the substrate during the production process. Thus, it would have been obvious to construct the susceptor of Burk et al wherein the area 6 (cut-out) that is in surface to surface contact with the substrate is made of a different material that the other portions of the susceptor. Though, Rupp et al does not specifically teach that the difference in the material of construction between the covering 5 and the susceptor cutout 6 is basis electrical conductivity it is noted that Ta, W, and Mo are materials with a higher electrical conductivity than (graphite, C or silicon, Si) as evidenced by *The Electrical Conductivity of the Elements Table.*

11. Claim 1, 8, 10, 11, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rupp et al ('167) in view of Burk, Jr. et al (US 5,788,777).

Rupp et al (US 6740,167) teaches a device for mounting a substrate. The device includes an insert 2 (zone) made of a metal carbide layer and a susceptor 1 (made of graphite an electrically and thermally conductive material). The wafer is supported in surface to surface contact with the insert such that it substantially corresponds to the supported surface of the substrate.

Regarding claim 1: Rupp et al '167 fails to teach a heater for the substrate holder.

Burk, Jr. et al teaches a susceptor 20 wherein rf (a from of HF) coils are provided to heat the holder 20. Col. 2 lines 36-42 recite that the heater 28 is provided to establish the required process temperature of the substrate. Thus, the motivation to provide the susceptor of Rupp et al '167 with the heater 28 is to ensure that the substrate can maintain the required process temperature. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the RF coils of Burk, Jr. et al.

Regarding claim 8: The insert piece 2 consist of TaC, MoC, WC according to col. 2 lines 60-64 of Rupp et al '167.

Regarding claim 10: Burk, Jr. et al illustrates that the holder is above the RF coils 28.

Regarding claim 11: The reactor of Burk, Jr. et al is a cold wall reactor, wherein heat is distributed to the walls only by the radiation of the heated substrate holder 20, see Fig.1.

Regarding claim 14: Rupp et al '167 teaches a holder 1, a first holder zone (insert 2) and a second substrate holder zone 1 (susceptor). Metals have a high electrical conductivity relative to non-metals and semiconductors. Note that the insert 2 substantially corresponds (in size and shape) to area taken up by the substrate

Rupp et al '167 fails to a HF heater.

Burk, Jr. et al (US 5,788,777) teaches a susceptor 20 wherein rf (a from of HF) coils are provided to heat the holder 20. Col. 2 lines 36-42 recite that the heater 28 is provided to establish the required process temperature of the substrate. Thus, the motivation to provide the susceptor of Rupp et al '167 with the heater 28 is to ensure that the substrate can maintain the required process temperature. Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the RF coils of Burk, Jr. et al.

Regarding claim 15: The first zone (insert 2) is formed by a metal carbide (made of a metallica perform) that is insertable into the holder 1, see the abstract.

Regarding claim 16: The insert comprises coated graphite, col. 3 lines 3-14.

Regarding claim 17: The insert piece 2 consist of TaC, MoC, WC according to col. 2 lines 60-64 of Rupp et al '167.

12. Claims 4-7 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burk, Jr. et al (US 5,788,777) in view of Rupp et al '167 or Rupp et al (US 2001/00523324).

Burk, Jr. et al teaches a susceptor 20 wherein rf (a from of HF) coils are provided to heat the holder 20. Col. 2 lines 36-42 recite that the heater 28 is provided to establish the required process temperature of the substrate,see Figs. 1, 4,5, 7, 7A, and &B..

Regarding claim 4: Burk, Jr. et al teaches that the holder 20/86 has a plurality of substrate bearing disks which are mounted on a gas bearing and each having an insert piece 22/90.

Regarding claim 5: The disks 86 consist of metal, specifically graphite according to col. 4 lines 10-25 of Burk, Jr. et al.

Regarding claim 6: Figs. 4 and 5 illustrate that the disks are disposed in a planetary fashion.

Regarding claim 7: Located in substrate bearing disk is located a gas bearing in a bearing recess, see Figs. 1. 7, 7A, and 7B.

Regarding claim 13: Gas enters the reactor via pipe 36,92 according to col. 4 lines 10-25.

Burk, Jr. et al fails to teach the insert piece has zone of higher electrical conductivity nor that the insert is made of metal.

Rupp et al '167 teaches a wafer supported by a susceptor 1 that includes an insert 2 wherein the wafer is in surface to surface contact with the insert. Rupp et al '167 teaches in col. 2 lines 49-64 the advantage of incorporating a high temperature region (zone) in the susceptor with the motivation that such zones ensure that no contamination from the susceptor will diffuse into the substrate. Thus, it would have been obvious to construct the susceptor of Burk, Jr. et al wherein the area 22 that is in surface to surface contact with the wafer is made of a material of higher electrical conductivity such as a metal carbide.

Likewise, Rupp et al (US 2001/0052324) teaches a holder that holds the substrate with surface to surface contact, the holder has a zone (cutout 6) has a higher electrical conductivity that the SiC coated susceptor 5. Note that the cut-out 6 substantially corresponds (in size and shape) to the supported surface of the substrate. The abstract teaches that the motivation to construct the device of Rupp et al in this fashion so to ensure that no contamination of the substrate during the production process. Thus, it would have been obvious to construct the susceptor of Burk et al wherein the area 6 (cut-out) that is in surface to surface contact with the substrate is made of a different material that the other portions of the susceptor. Though, Rupp et

al does not specifically teach that the difference in the material of construction between the covering 5 and the susceptor cutout 6 is basis electrical conductivity it is noted that Ta, W, and Mo are materials with a higher electrical conductivity than (graphite, C or silicon, Si) as evidenced by *The Electrical Conductivity of the Elements Table.* Thus, it would have been obvious to construct the susceptor of Burk, Jr. et al wherein the area 22 that is in surface to surface contact with the wafer is made of a material of higher electrical conductivity such as a metal carbide.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R. MacArthur whose telephone number is 571-272-1438. The examiner can normally be reached on M-F during the hours of 8:30 a.m. and 5 p.m.

14. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sylvia R MacArthur
Patent Examiner
Art Unit 1763

December 26, 2006